

08/827037

In the United States Patent and Trademark Office



Docket No.	Anticipated Classification		Prior Application		
	Class	Subclass	Serial No.	Examiner	Art Unit
92-206.3	340	572	08/421,571	Swann III, G.	2617

Assistant Commissioner for Patents
 PATENT APPLICATION
 Washington, D.C. 20231

March 25, 1997

Request for Filing a Patent Application Under 37 CFR 1.60

This is a request for filing a continuation application, under 37 CFR 1.60, of pending prior application:

Serial No.: 08/421,571

Filed: 4/11/95

Inventor: John R. Tuttle

Title: Anti-Theft Method for Detecting the Unauthorized Opening of Containers and Baggage

- Enclosed is a true copy of the latest inventor-signed prior application, including:
 - Specification (15 pages, plus Abstract).
 - Drawings, informal (8 sheets, Figures 1-7).
 - Declaration (2 pages) showing the original signature dated 11/12/93.
- The inventors in this application are the same as the inventors named in the prior application.
- A preliminary amendment is enclosed.
- Cancel in this application original claims 2-14 of the prior application before calculating the filing fee. (*At least one original independent claim is retained.*)
- The prior application is assigned of record to: Micron Communications, Inc.

6. Filing Fee Calculation

	Number Filed		Number Extra	Rate per claim	Fee
Total claims	1	-20	= 0	x \$ 22	= \$ 0
Independent claims	1	-3	= 0	x \$ 80	= \$ 0
Basic Filing Fee					\$ 770
Total Filing Fee					\$ 770

7. Enclosed is a check in the amount of **\$770.00** for the total filing fee required under 37 CFR 1.16.

8. ☐ (a) A newly executed power of attorney is enclosed.

☒ (b) The power of attorney in the prior application is to:

Robert J. Stern, Registration no. 29,703

Greg Blodgett, Registration no. P39,114

Sue Collier, Registration no. 34,566

Lia Dennison, Registration no. 34,095

W. Bryan Farney, Registration no. 32,651

Angus Fox, Registration no. 31,828

Kevin Martin, Registration no. P37,882

David Paul, Registration no. 34,692

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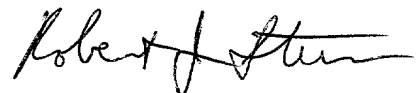
☐ (i) The power of attorney appears in the original papers in the prior application.

☒ (ii) Since the power of attorney does not appear in the original papers, enclosed is a copy of the power in the prior application signed on 5/12/95.

☒ (c) Address all future correspondence and telephone calls to:

Robert J. Stern
1360 Cotton St.
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Respectfully submitted,



Robert J. Stern
 Attorney for Applicant
 Registration no. 29,703



In the United States Patent and Trademark Office

In re Patent Application of:

Inventor: John R. TUTTLE

Serial No: Unknown (Continuation of SN 08/421,571)

Filing Date: 3/25/97

Title: Anti-Theft Method for Detecting the Unauthorized
Opening of Containers and Baggage

Prior Examiner: Swann III, G.

Prior Group Art Unit: 2617

Attorney docket: 92-206.3

Assistant Commissioner for Patents
Box PATENT APPLICATION
Washington, D.C. 20231

March 25, 1997

PRELIMINARY AMENDMENT

Sir:

Please enter the following amendment prior to examination of the above-identified continuation patent application.

In the Abstract

Lines 1-3, delete the first sentence.

Lines 11-12, change "A second embodiment also comprises a magnetic circuit approach in which the" to: --In a second embodiment, a--

Line 22, change the first word "the" to --the--.

In the Specification

In the section entitled "CROSS-REFERENCE TO RELATED APPLICATION", after "This application is", please insert: --a continuation of application serial no. 08/421,571 filed 4/11/95; which is a continuation of application serial no. 08/151,599 filed 11/12/93, now U.S. Patent 5,406,263; which is--

In the section entitled "CROSS-REFERENCE TO RELATED APPLICATION", please delete the sentence which reads "This application is also related to copending U.S. Patent Application No. 07/899,777, filed June 17, 1992."

Page 3, line 26, delete "taken along lines 3-3".

Page 4, line 12, change "first" to -- second --

Page 4, line 16, change "ten (10)" to --nine(9)--

Page 4, line 18, after "RFID", insert: -- (radio frequency identification) --

Page 5, line 13, change "antennal" to -- antenna --

Page 7, line 24, change "an via" to: --and, via--

Page 7, line 25, after "162", insert a comma.

Page 8, line 7, change "in light of" to: --used in--

Page 8, line 12, change "form" to --from--

Page 9, line 28, change "2A" to -- 7A --

Page 10, line 3, change "2B" to -- 7B --

Page 10, line 11, change "is" to: -- be --

In the Claims

Please cancel claims 1–14.

Please insert new claims 15–24 as follows:

1 15. For an apparatus having an aperture which is selectably closed and opened by
2 moving first and second closure members together and apart, respectively, an improved security
3 device for detecting whether the aperture is opened, comprising:

4 (a) an elongated electrical conductor having first and second ends, the conductor
5 extending between the two closure members and being attached to both the first closure member
6 and the second closure member so that the two closure members cannot be moved apart a
7 substantial amount to open the aperture without breaking the conductor; and

8 (b) an RFID transceiver, connected to the two ends of the conductor, including an
9 electrical circuit for detecting when electrical continuity between the two ends of the conductor
10 is broken and subsequently transmitting an alarm signal.

1 16. A security device according to claim 15, wherein said apparatus is a container and
2 the first and second closure members are external walls of the container.

3
4 17. A security device according to claim 16, wherein the RFID transceiver is embedded
5 within a wall of the container.

1 18. A security device according to claim 15, wherein said apparatus is a suitcase and the
2 first and second closure members are external walls of the suitcase.

1 19. For an apparatus having an aperture which is selectably closed and opened by
2 moving first and second closure members together and apart, respectively, an improved security
3 device for detecting whether the aperture is opened, comprising:

4 (a) an electrical device, mounted on the apparatus adjacent the aperture, for detecting
5 whether the aperture is open or closed; and

6 (b) an RFID transceiver which transmits an alarm signal after said device detects the
7 aperture has been opened.

1 20. A security device according to claim 19, wherein the electrical device includes a
2 magnet.

1 21. A security device according to claim 19, wherein the electrical device includes an
2 elongated electrical conductor having first and second ends, the conductor extending between the
3 two closure members and being attached to both the first closure member and the second closure
4 member so that the two closure members cannot be moved apart a substantial amount to open the
5 aperture without breaking the conductor.

1 22. A security device according to claim 19, wherein said apparatus is a container and
2 the first and second closure members are external walls of the container.

1 23. A security device according to claim 22, wherein the RFID transceiver is embedded
2 within a wall of the container.

1 24. A security device according to claim 19, wherein said apparatus is a suitcase and the
2 first and second closure members are external walls of the suitcase.

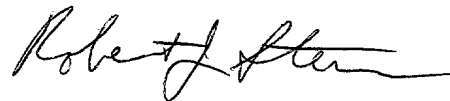
REMARKS

No fee is due because the number of independent claims is only 2 and the total number of claims is only 10.

Claims 1-14 were granted in the original parent application SN 08/151,599, now U. S. Patent 5,406,263, and they are canceled from this continuation application. The only claims pending are newly added claims 15-24, of which claims 15 and 19 are independent claims.

The claims now pending were rejected in the immediate patent application SN 08/421,571 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over certain claims in the aforementioned U. S. Patent 5,406,263, the original parent of the present application.

Respectfully submitted,



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Serial No:
Inventor(s): Tuttle



ANTI-THEFT METHOD FOR DETECTING THE UNAUTHORIZED
OPENING OF CONTAINERS AND BAGGAGE

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part to U.S. Patent Application No. 07/921,037, filed July 27, 1992, now abandoned. This application is also related to copending U.S. Patent Application No. 07/899,777, filed June 17, 1992.

Field of the Invention

This invention relates generally to anti-theft devices and in particular to a method for detecting unauthorized opening of containers and baggage.

5 Background of the Invention

Protecting personal property has become a major industry from a security system standpoint. Security systems today can be as elaborate as those installed to protect banking institutions, equipped with video cameras, hooked-up as alarms to the local police station and security guards, or be as simple as a car alarm that is sounded when the door is forced open.

15 Likewise, the shipping industry is faced with an increasingly growing security problem in that containers, packages, baggage, luggage and mail (all of which may be referred to as simply "shipping container" hereinafter) are vulnerable to being opened by unauthorized personnel, who might steal the contents. As this problem increases it

becomes necessary to protect these articles in order to protect the customer's property.

5 Due to the smaller size and larger quantity of the shipping articles mentioned above, the protection system used must be compact for concealment purposes, and somewhat simple in operation, thereby making them easy to produce and install in mass quantities while being fairly easy to monitor and operate.

10 The anti-theft method of the present invention conveniently addresses all of these issues to provide a workable and fairly inexpensive solution to securing safe transportation of articles shipped in some type of enclosed shipping container.

Summary of the Invention

15 The present invention introduces a method for protecting against the unauthorized opening of shipping containers which is disclosed in the several embodiments following.

20 A first embodiment comprises a simple trip-wire or magnetic circuit that provides continuity, which is detected electrically. Simply, if continuity is disabled by a forced entry of the container, electrical detection means, such as a radio-frequency-identification (RFID) transceiver tag (or simply RFID tag), will alert the owner or monitoring station. The trip-wire concept would require the replacing of a broken
25 trip wire (resulting from forced entry), while the magnetic circuit concept can be reused repetitively.

5 A second embodiment comprises the magnetic circuit approach of the first embodiment by having the magnetic circuit and the detection device embedded into the shipping article during manufacturing. The preferred detection device, and RFID tag, could also be a battery backed transceiver type on which a replaceable or rechargeable battery could be mounted on the inside of the shipping container during manufacturing. The RFID tag would communicate with an interrogator unit, which could be connected to a host computer. The interrogator and/or the host computer would then monitor the shipping container's status (opened or closed). The RFID tag could also have an output that changes state upon alarm, so that another device could be connected to indicate the alarm via sound, flashing lights or other means.

15 Implementation of the present invention will become readily understandable to one skilled in the art in the detailed descriptions that follow.

Brief Description of the Drawings

20 Figure 1 is a process flow diagram showing the major processing stations and fabrication stages used in an overall manufacturing process of an RFID tag;

Figure 2 is an enlarged perspective view of an RFID tag as constructed in accordance with the process flow of Figure 1;

25 Figures 3A through 3E are cross sectional views taken along lines 3-3 of Figure 2 showing the major processing steps used to construct the RFID tag;

Figure 4 is a functional block diagram showing the major signal processing stages within the RFID integrated circuit chip described herein and also within the interrogation unit used to interrogate the chip;

5 Figure 5 is a functional block diagram showing the communication between several RFID tags and interrogation unit;

10 Figures 6, 6A and 6B depict a shipping container (luggage) on which a first embodiment of the present invention has been installed; and

Figures 7, 7A and 7B depict a shipping container (luggage) on which a first embodiment of the present invention has been installed.

Detailed Description of the Preferred Embodiments

15 Referring now to Figure 1, the process flow diagram shown in this figure includes ten (10) major processing stations or fabrication stages which are used in the overall manufacturing process steps that may be used to fabricate an RFID tag unit used in the anti-theft method of the present invention. These
20 stages are described in more detail below with reference to Figures 2 and 3A through 3E. Initially, a circuit pattern is formed on a polymer base material in station 10, whereafter the circuit pattern is cured and an epoxy conductive material is applied to station 12 before aligning an integrated circuit
25 chip onto the polymer base in station 14. Next, batteries

(batteries added to the RFID package is optional) are aligned onto the polymer base in station 16 whereafter the epoxy is cured in station 18.

5 In the next step, the rear battery epoxy is applied in station 20 before adding a stiffener and then folding the polymer base over onto the top cover as indicated in station 22. The epoxy material is then cured in station 24 before providing a final sealing step in stage 26 to complete the package as described in more detail below.

10 Referring now to Figure 2, an RFID tag is depicted that includes a base support member 30 upon which an integrated circuit chip 32 is disposed on the near end of the device and connected to a dipole antennal consisting of metal strips 34 and 36 extending laterally from the chip 32 and typically
15 screen printed on the upper surface of the base support member 30.

A pair of rectangular shaped batteries 38 and 40 are positioned as shown adjacent to the IC chip 32 and are also disposed on the upper surface of the base support member 30.
20 The two rectangular batteries 38 and 40 are electrically connected in series to power the IC chip 32 in a manner more particularly described below. The device or package shown in Figure 2 is then completed by the addition of an outer or upper cover member 42 which is sealed to the exposed edge
25 surface portions of the base member 30 to thereby provide an hermetically sealed and completed package. The integrated chip 32 has transmitter, memory, logic, and receiver stages therein and is powered by the two batteries 38 and 40 during the transmission and reception of data to and from an
30 interrogator to provide the interrogator with the various

above identified information parameters concerning the article or person to which the RFID tag 30 is attached. The integrated chip may be designed to contain the needed circuitry one skilled in the art needs to accomplish the
5 desired task and therefore may or may not contain all the circuitry listed above.

Referring now to Figure 3A, there is shown a plan view of the geometry of the base support member 30 and the cover member 42 which, during the initial manufacturing stage, are
10 joined at an intersecting line 44. The dipole antenna strips 34 and 36 shown positioned on each side of the IC chip 32, and the two conductive strips 46 and 48 serve to connect the tops of the batteries 38 and 40 into the IC chip 32. A conductive
15 strip 50 is provided on the upwardly facing inside surface of the top cover 42, so that when the cover 42 is folded by 180°C, its outer boundary 52 is ready to be sealed with the outer boundary 54 of the base support member 30, and simultaneously the conductive strip 50 completes the series
20 electrical connection used to connect the two batteries 38 and 40 in series with each other and further in the series circuit with the integrated circuit chip 32 through the two conductors 46 and 48.

Referring now to Figures 3B through 3E, Figure 3B shows in cross section the IC chip 32 bonded to the base support
25 member 30 by means of a spot button of conductive epoxy material 56. The conductive strip 48 is shown in cross section on the upper surface of the base support member 30. This figure would correspond generally to the fabrication stations 10, 12, and 14 in Figure 1.

Referring now to Figure 3C, the battery 40 is aligned in place as indicated earlier in Figure 2 and has the right hand end thereof connected to the upper surface of the conductive strip 48. Figure 3 would therefore correspond to stations 16 and 18 in Figure 1.

Referring now to Figure 3D, a stiffener material 58 is applied as shown over the upper and side surfaces of the IC chip 32, to provide a desired degree of stiffness to the package as completed. Figure 3D would therefore correspond to stations 20 and 22 in Figure 1.

Next, a conductive epoxy is applied to the upper surfaces of the two batteries 38 and 40, and then the polymer base material 30 with the batteries thereon are folded over onto the cover member 42 to thus complete and seal the package in the configuration shown in Figure 3E and corresponding to the remaining stations 24 and 26 in Figure 1.

Referring now to Figure 4, the rectangular outer boundary 159 in this figure defines the active area on the integrated circuit chip in which the integrated circuit transceiver has been formed using state of the art MOS planar processing techniques. These MOS planar processing techniques are well known in the art and are, therefore, not described in detail herein. Within the chip active area there is provided an RF receiver stage 160 which is connected to an antenna 161 and via one or more lines or circuit connections 162 to a control logic stage 164. The control logic stage 164 is in turn connected via one or more integrated circuit connections or lines 166 to a memory stage 168. The control logic stage 164 is further connected via a line 170 to a transmitter stage 174, and the memory stage 168 is also connected via line 172

to the trasmitter stage 174. The memory stage 168 is operative to provide input data to the transmitter stage 174 upon request, and functions in a manner operationally described in the example given below.

5 Figure 5 is a functional block diagram showing a method of communication between several RFID tags and an
of communication between several RFID tags and an
interrogation unit in light of the anti-theft detection units
later described in Figures 6 and 7. Referring now to Figure
5, Host/CPU 51 interacts with interrogator/transceiver unit 52
10 and instructs unit 52 to interrogate RFID tags A (53) and B
(54) for alarm data. If interrogator 52 receives no reply
form either tag A or tag B the host 51 continues to instruct
unit 52 to interrogate tags A and B as often as internal
software demands it. However, if tag A responds (in an alarm
15 state) the interrogator unit 52 communicates that information
to the host 51 and an appropriate alarm is sounded to notify
personnel that unauthorized opening of a container has just
taken place.

20 By using the communication approach taken in Figure 5, a
first embodiment of an "unauthorized opening detection device"
is shown in Figure 6 with variations of this embodiment shown
in expanded views of Figure 6 presented in Figures 6A and 6B.

25 Referring now Figure 6, shipping container 60 (luggage in
this case) is adorned with an "unauthorized opening detection
unit" enclosed by outlined dashed circle 62. Expanded view 6A
of dashed circle 62 shows a continuous wire 63 attached to
both sides of container 60 at a first connection node 64, then
to second connection node 65, continuing to RFID tag 67 (which
is affixed to label 66) onto which wire 63 is attached.
30 Wire 63 then completes its continuity path by attaching tag 67 to

starting point node 64. If continuity is disrupted (wire 63 breaks by unauthorized opening of container 20) tag 67 would then signal the interrogator or some other device to sound an alarm and alert the owner or possibly security personnel in case of airline luggage transportation. Disarming the detection unit may be done by command from the interrogator or by the software at a given site, say at the container's destination, which may simply ignore the "opened" signal.

Expanded view of Fig. 6B shows a second means of installing a detection device wherein continuous wire 63 attaches to a first connection node 64, continues to a second connection node 65, routes to RFID tag 67 (which is affixed to label 66) and routes back to node 65 and finally to node 64.

Both attaching methods serve as examples of how the opening detection unit may be attached to containers or doors that open. It would be preferred to have the wire attached so that it is not easily detected by casual observance and not easily broken by accident. Tag 67 could be affixed to label 66 with tag 67 itself being adhered to a self-adhesive paper, such as stamp, and then applied to the label.

A second embodiment of an "unauthorized opening detection device" is shown in Figure 7 with this embodiment shown in expanded views 7A and 2B.

Referring now to Figure 7, shipping container 70 (luggage in this case) is adorned with an "unauthorized opening detection unit" enclosed by outlined dashed circles 71 and 72. In expanded view 2A of dashed circle 71, in the edge of container 70 a magnetic contact 73 is embedded. This magnetic contact 73 is preferably located in close proximity to a latch

of container 70, or magnetic contact 73 may also function as half the latching mechanism to the container. In expanded view 2B of dashed circle 72, an RFID tag 78 is affixed to the top face of container 70. Electrical connections 74 extend from RFID tag 70 and attached to magnetic contacts 75 and 76. Magnetic contacts 75 and 76 may also function as the other half of the latching mechanism to the container. When container 70 is closed, contacts 75 and 76 mate with contact 73, thereby completing an electrical circuit. Unless disabled by the owner, should the container be forced open and continuity between contacts 73, 75 and 76 is disrupted, an alarm state bit is set in (in the alarm flagging circuitry) tag 78 which will signal the interrogator or other controlling device to sound an alarm to alert the owner or security personnel. Tag 78 will remain in an alarm state until the alarm state bit is reset by the interrogator/controlling unit.

The detection device of Figure 7A could be further enhanced by providing a replaceable battery 79, a power enabling means, for powering tag 78. It would be logical to have the battery only accessible from the inside of container 70 which would mean tag 78 would need to be embedded into container 70 and preferably embedded during the manufacturing of container 70. With a replaceable battery powered tag, tag 78 would now have the capability to send an alert signal to an interrogator unit or other device (such as a computer controlled transceiver unit) which would monitor the status of container 70 over its entire lifetime.

The methods of the embodiments discussed above, can easily be implemented into security systems. For example, by attaching the RFID tag and continuity completing circuitry to span between an entry/exit door and the framework supporting

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Inventor(s): Tuttle

the door, unauthorized entry can now be monitored by activating the system when the door is to remain closed. Other such security schemes could also use the monitoring methods of the present invention.

5 It is to be understood that although the present invention has been described in several embodiments, various modifications known to those skilled in the art, such as applying these techniques to any kind of containers (mail, freight, etc.) or by various methods of attaching the
10 detection device to the container, may be made without departing from the invention as recited in the several claims appended hereto.

Claims:

1. A continuity detection unit attached to an opening/closing structure, said unit comprising:

5 a) an RFID transceiver tag having an alarm flagging circuitry, power enabling means, an input node and an output node; and

b) a continuity circuit for connecting said input node to said output node wherein said continuity circuit spans the open/close portion of said structure.

10 2. The continuity detection unit of claim 1 wherein said opening/closing structure comprises an entry way.

3. The continuity detection unit of claim 1 wherein said opening/closing structure comprises a container.

15 4. The continuity detection unit of claim 1 wherein said unit is attached to said structure by an adhesive.

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Inventor(s): Tuttle

5. The continuity detection unit of claim 1 wherein said unit is attached to said structure by being embedded in said structure.

6. The continuity detection unit of claim 1 wherein said
5 power enabling means comprises a replaceable battery.

7. The continuity detection unit of claim 1 wherein said power enabling means comprises a rechargeable battery.

8. The continuity detection unit of claim 6 wherein said
10 RFID transceiver tag is monitored by a computer controlled transceiver unit.

9. The continuity detection unit of claim 7 wherein said RFID transceiver tag is monitored by a computer controlled transceiver unit.

10. The continuity detection unit of claim 7 wherein said
15 RFID transceiver tag is monitored by alarm producing devices.

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Inventor(s): Tuttle

11. The continuity detection unit of claim 1 wherein said continuity circuit comprises a continuous wire.

12. The continuity detection unit of claim 2 wherein said continuity circuit comprises first and second mating magnetic contacts located on opposite opening portions of said container whereby said contacts opposite each other make contact to one another upon closure of said container with one set of said mating contacts being electrically connected to said RFID transceiver tag.

13. The continuity detection unit of claim 1 wherein said continuity circuit comprises first and second mating electrical contacts located on opposite opening portions of said container whereby said contacts opposite each other make contact to one another upon closure of said container with one set of said mating contacts being electrically connected to said RFID transceiver tag.

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Inventor(s): Tuttle

14. The continuity detection unit of claim 1 wherein said
continuity circuit comprises first and second mating contacts
on both sides of the container latch which make contact with
each other upon closure of said container with one set of said
5 mating contacts being electrically connected to said RFID
transceiver tag.

Serial No:
Inventor(s): Tuttle



ANTI-THEFT METHOD FOR DETECTING THE UNAUTHORIZED
OPENING OF CONTAINERS AND BAGGAGE

ABSTRACT

5 The present invention introduces a method for protecting
against the unauthorized opening of shipping containers in a
first embodiment. A simple trip-wire or magnetic circuit
associated with a shipping container provides continuity,
which is detected electrically. Simply, if continuity is
disabled by a forced entry of the container, electrical
10 detection means, such as a radio-frequency-identification
(RFID) tag, will alert the owner or monitoring station. The
trip-wire concept would require the replacing of a broken trip
wire (resulting from forced entry), while the magnetic circuit
concept can be reused repetitively. A second embodiment also
15 comprises a magnetic circuit approach in which the magnetic
circuit and the detection device (RFID tag) are embedded into
the shipping article during manufacturing. The preferred
detection device, an RFID tag, could also be a battery backed
transceiver type on which a replaceable or rechargeable
20 battery could be mounted on the inside of the shipping
container during manufacturing. The RFID tag would
communicate with an interrogator unit, which could be
connected to a host computer. The interrogator and/or the
host computer and/or other alarm devices would then monitor
25 the shipping container's status (opened or closed).

D E C L A R A T I O N

As a below named inventor(s), I (we) hereby declare that:

My (our) residence, post office address and citizenship are as stated below next to my (our) name;

I (we) believe I (we) am (are) the original, first and sole (joint) inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled: **ANTI-THEFT METHOD FOR DETECTING THE UNAUTHORIZED OPENING OF CONTAINERS AND BAGGAGE**; the specification of which is attached hereto;

I (we) hereby state that I (we) have reviewed and understand the contents of the above identified specification, including the claims;

I (we) acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations Section 1.56(a);

I (we) hereby claim foreign priority benefits under Title 35, United States Code Section 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed;

I (we) hereby claim the benefit under Title 35, United States Code Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I (we) acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application;

I (we) hereby declare that all statements made of my (our) own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon;

POWER OF ATTORNEY: As a named inventor, I appoint the following as attorney(s)/agent(s) to transact all business in the Patent and Trademark Office for this application; David J. Paul, (Registration #34,692), Michael W. Starkweather, (Registration #34,441), Stanley N. Protigal, (Registration #28,657), Angus C. Fox, III, (Registration #31,828), Susan B. Collier, (Registration #34,566), Lia M. Pappas, (Registration #34,095), and/or William R. Bachand, (Registration #34,980).

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(First) (MI) (Last)

Inventor's Signature: [Signature] Date: 11/12/93

Citizenship: United States of America

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City, State and Country of Residence: Corrales, New Mexico 87048
Corrales, New Mexico, USA

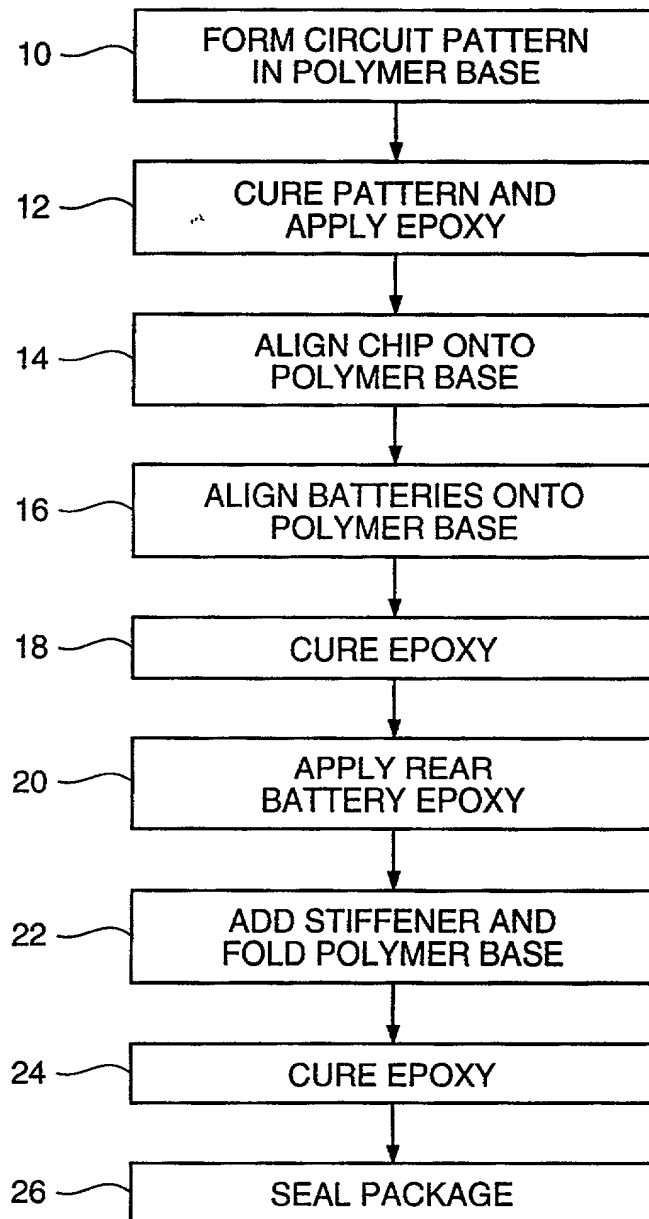


FIG. 1

COPY	BY	DATE	O.G. FIG.
CLASS	SUBCLASS		

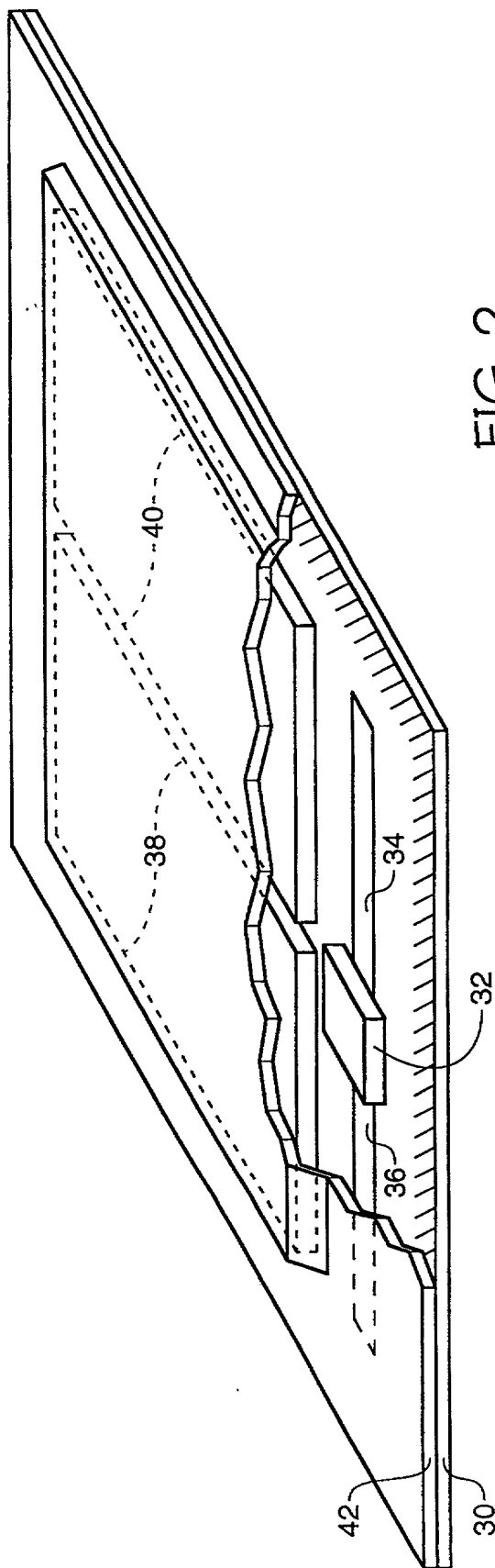


FIG. 2

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48
 32
 56
 30

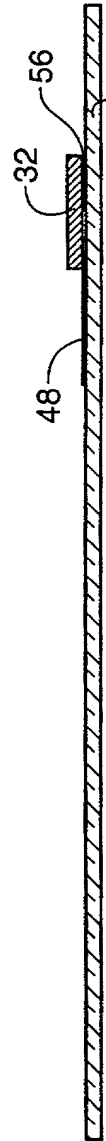


FIG. 3B

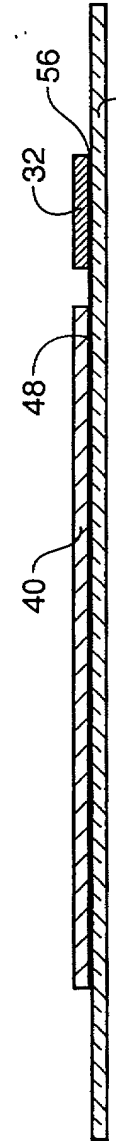


FIG. 3C

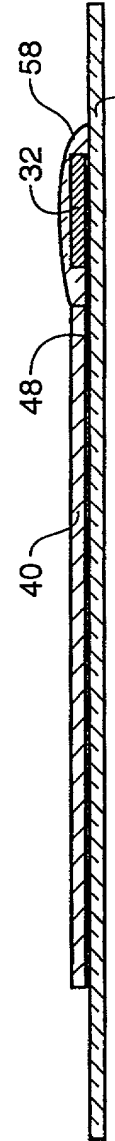


FIG. 3D

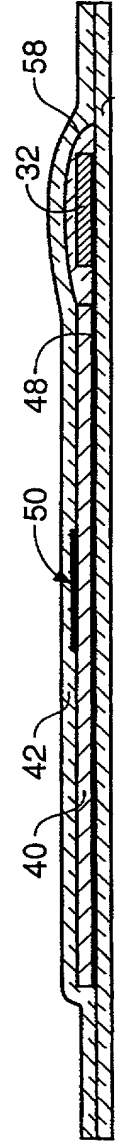


FIG. 3E

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0.6. 11.	CLASS	SUB-CLASS
BY	CLASS	SUB-CLASS
EXAMINER		

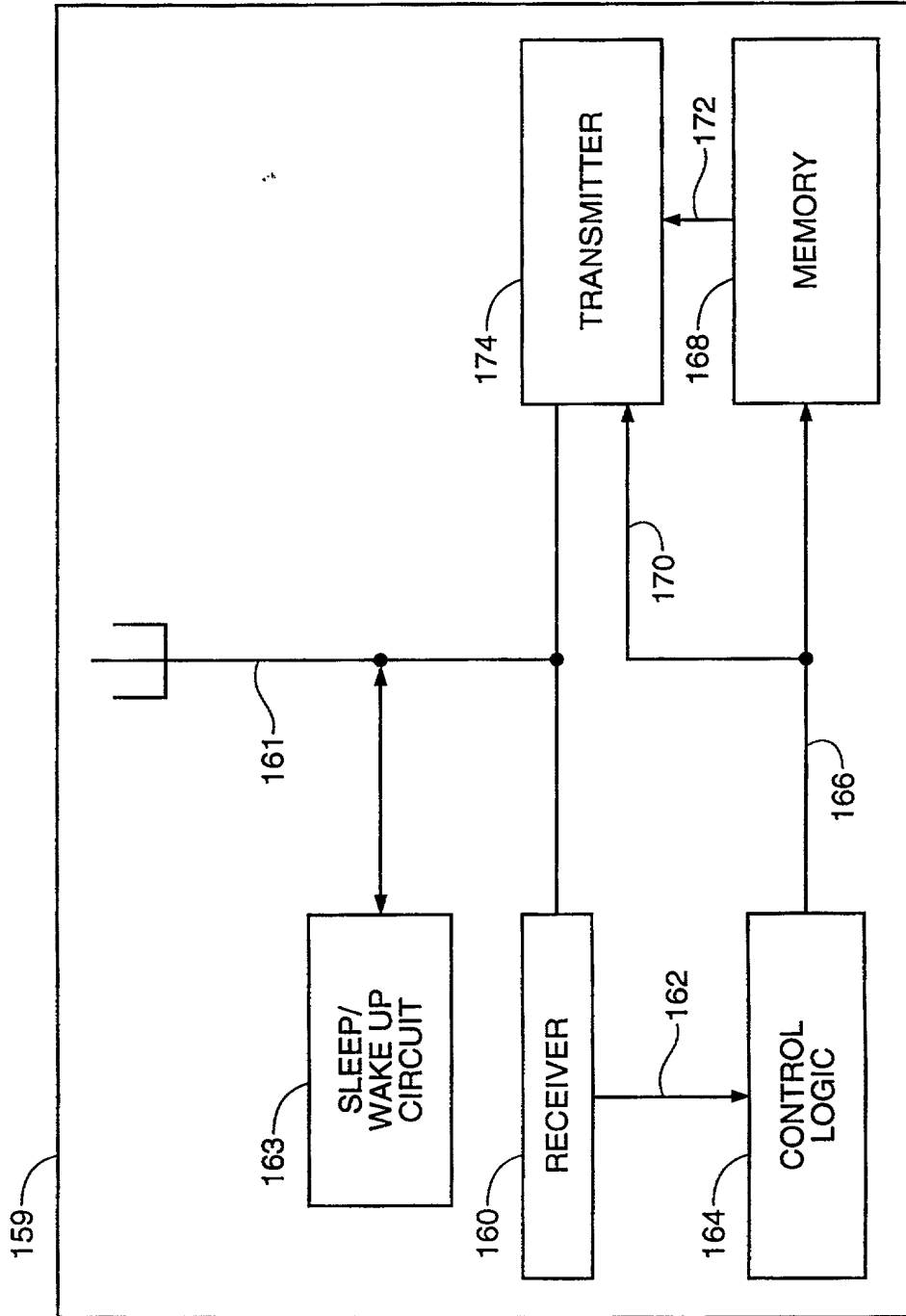


FIG. 4

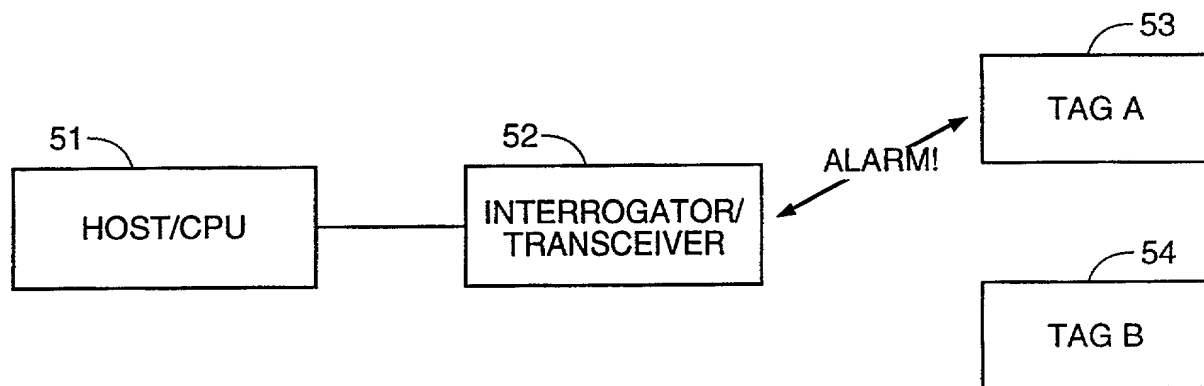


FIG. 5

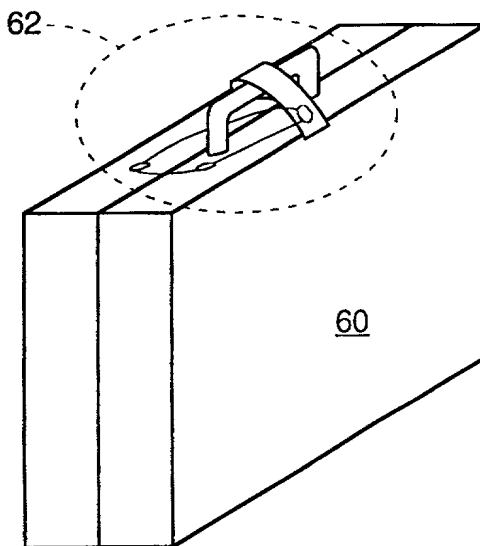


FIG. 6

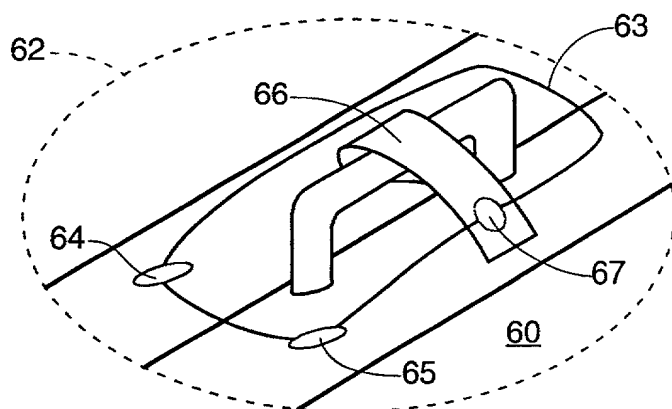


FIG. 6A

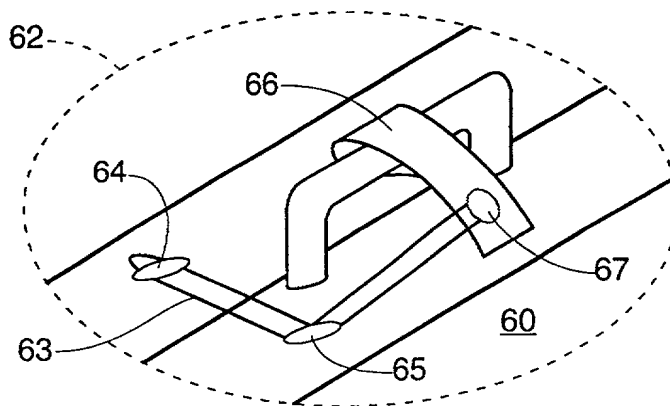


FIG. 6B

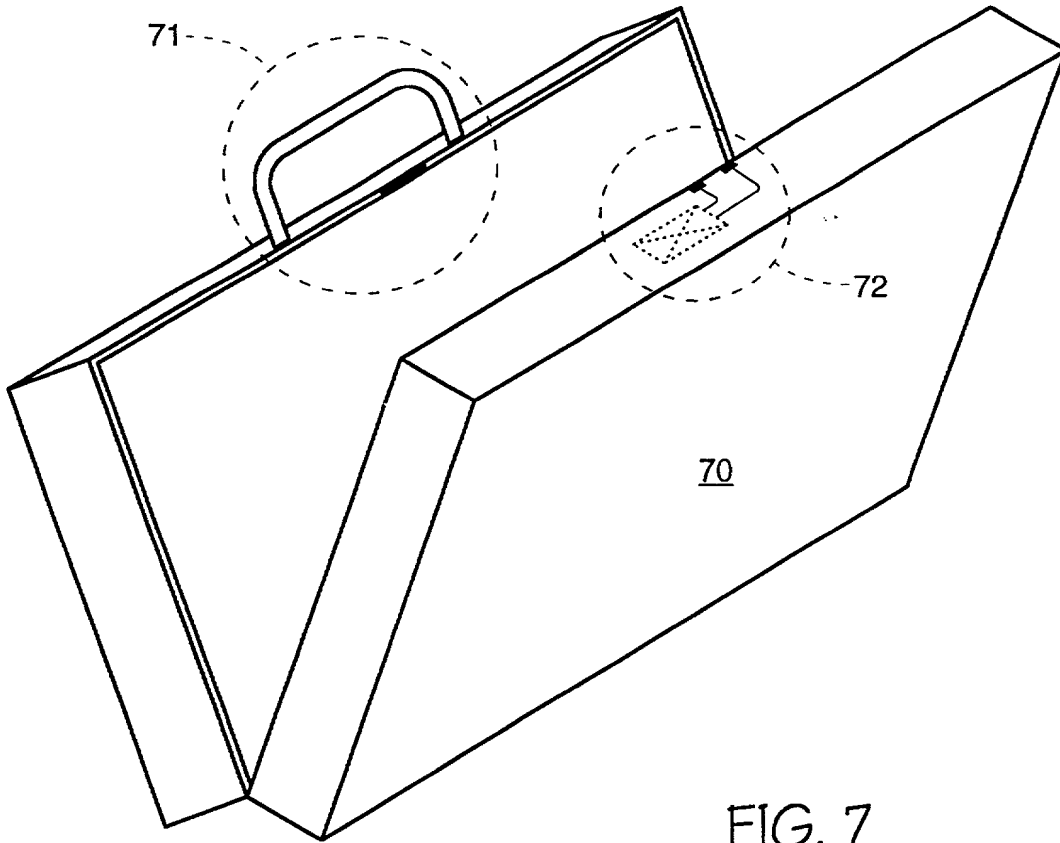


FIG. 7

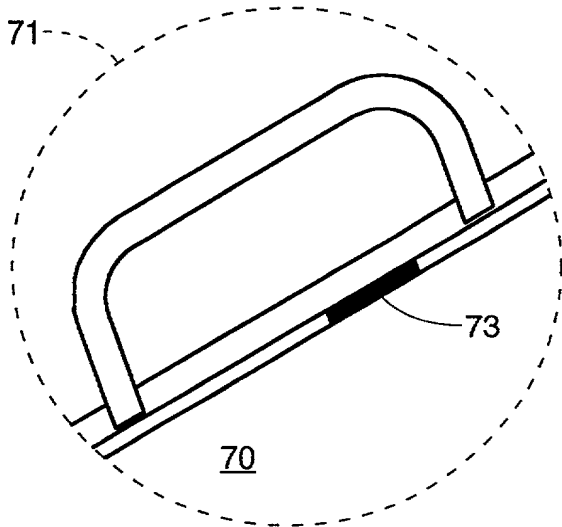


FIG. 7A

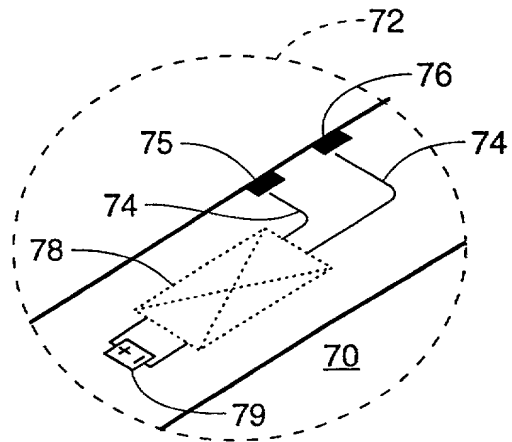


FIG. 7B

0.6.10.
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PATMAN